

STATUS OF CLAIMS

Claims 1-5, 7-12, 14-24, 26-50 are pending.

REMARKS

Claims 1-5, 7-12, 14-24, 26-50 are now pending in this application, claims 6, 13 and 25 having been canceled and claims 36-50 having been added. Claims 1, 9, 21, 36 and 43 being the independent claims.

Independent claims 1, 9 and 21 have been amended to include the subject matter previously set forth in dependent claims 6, 13, and 25, respectively.

Claims 1-3, 5-10, 12-13, 18-19, and 33-35 stand rejected under 35 U.S.C. 102(e) as being anticipated by Drake et. al, U.S. Patent No. 6,377,394. In addition, claims 4 and 11 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Drake in view of allegedly admitted prior art. Claims 14-17, 20-29, and 30-32 stand rejected as being unpatentable over Drake in view of various combinations of Denkin, U.S. Patent No. 6,356,386. These rejections as they apply to the pending claims are hereby traversed for the following reasons.

The present invention provides a method and apparatus for automatically controlling the gain of an optical amplifier. Automatic gain control (AGC) is achieved by adjusting the pump power supplied to the optical amplifier. The pump power is determined in accordance with both feed-forward and feedback error signals. However, as now set forth in independent claims 1, 9 and 21, if the input power to the optical amplifier exceeds a predetermined threshold, the pump power is determined in accordance with the feed-forward error signal and not the feedback error signal. As discussed on page 3, lines 4-25 of the specification, in a feed-forward arrangement the pump power is adjusted based solely on changes to a parameter that is input to the optical amplifier such as the input power, for example. In a feedback arrangement, the pump power is adjusted based on at least one output parameter (e.g., the output power), and possibly an input parameter as well.

In rejecting now canceled claims 6, 13 and 25 the Examiner asserts that Drake et al. discloses an AGC arrangement in which both feedback and feed-forward control signals are employed. The Examiner further asserts that the pump power is determined in

accordance with the feed-forward error signal and not the feedback error signal if the input power to the optical amplifier exceeds a predetermined threshold. In particular, the Examiner points to column 6 of the patent in asserting that the claimed predetermined threshold corresponds to the P-control value discussed in Drake et al.

As the Examiner has previously noted, Drake et al. states in the Background portion of the patent that "AGC schemes may use feed-forward or feedback loops, or a combination of these..." (col. 1 lines 53-57). However, as the Applicants have discussed in prior responses, the invention set forth in Drake et al. itself is not directed to how both feed-forward and feedback can be used together. Rather, Drake et al. is concerned with the use of a PID loop in a multi-pump amplifier arrangement. For this reason it is unsurprising that the P-control value discussed in Drake et al. is unrelated to the specifics of feed-forward or feedback control.

More specifically, the P-control value in Drake et al. refers to the proportional coefficient of the PID control loop that is used in controlling a multi-pump amplifier. This is graphically illustrated in FIG. 3, which shows the amount by which the error signal is amplified in order to produce the pump control signals (see col 5, lines 33-37). This amplification, which Drake et al. refers to as "P-control," is used in the optical amplifier shown in FIG. 4 (see mapping unit 46) to control the proportional controller. Drake et al. employs this control coefficient dependence because the optical amplifier uses multiple pumps. In a multi-pump arrangement, as more pumps are employed the less pump power each pump should proportionately change relative to a given input error signal (which is independent of the number of pumps). This interpretation of the P-control value is further supported at col 5, lines 46-52 of the patent, which states that each time an additional pump is introduced there is a drop in the amplification factor.

Thus, the P-control value disclosed by Drake et al. is clearly related to calculating the appropriate response to a given error signal rather than generating the error signal itself. In contrast, the predetermined threshold claimed in the present application determines an appropriate combination of feed forward and feedback error signals to optimize amplifier control, independent of the number of pumps. Accordingly, for at least this reason, independent claims 1, 9 and 21 and the claims that depend therefrom are believed to be patentable over Drake et al.

Newly added independent claim 36 is similar to original claim 1 except that claim 36 additionally recites that the pump source is adjusted in accordance with the second control signal and not the first control signal *unless a sufficiently large change in power of an optical signal is received at the input to the optical amplifier in which case the pump source is adjusted based on both the first control signal and the second control signal*. Support for this limitation is provided in paragraph 53 of the specification. Claim 36 is allowable for at least the same reasons discussed above in connection with independent claims 1, 9 and 21. That is, Drake et al. does not discuss how and under what conditions feed-forward and feedback error signals should be combined.

Likewise, newly added claim 43 is similar to original claim 1 except that claim 43 recites that the *second control signal is further based on a feedback gain coefficient that is smaller than would otherwise be employed in a gain control arrangement that exclusively employs a feedback error signal and not a feed-forward error signal*. Support for this limitation is provided in paragraph 51 of the specification. Once again, Drake et al. does not disclose this claimed feature since Drake et al. does not discuss how and under what conditions feed-forward and feedback error signals should be combined.

CONCLUSION

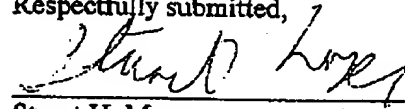
For at least the above reasons it is respectfully requested that the rejection of independent claims 1 and 9 under 35 U.S.C. 102(e) and claim 21 under 35 U.S.C. 103(a) be reconsidered and withdrawn. The rejection of the dependent claims should also be reconsidered and withdrawn since these claims depend from and further define the invention of claim 1, 9 and 21.

In view of the foregoing, it is believed that the application is now in condition for allowance and early passage of this case to issue is respectfully requested. If the Examiner believes there are still unresolved issues, a telephone call to the undersigned would be welcomed.

FEES

The Examiner is authorized to charge all fees due and owing in respect to this amendment to deposit account number 50-1047.

Respectfully submitted,



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